AMENDMENTS TO THE CLAIMS

1. (Original) A method for repair of a gas turbine blade, comprising:

providing a gas turbine blade, said blade comprising a blade tip and a blade body;

removing at least one portion of said blade tip;

providing at least one freestanding tip insert; and

disposing said at least one tip insert onto said gas turbine blade body such that said at least one tip insert replaces said at least one removed portion of said blade tip.

2. (Original) The method of claim 1, wherein said blade tip comprises at least one squealer, and said at least one portion of said blade tip comprises said at least one squealer.

3. (Original) The method of claim 1, wherein disposing comprises joining said at least one tip insert to said blade by means of a process selected from the group consisting of welding, brazing, and diffusion bonding.

4. (Original) The method of claim 1, wherein said at least one tip insert comprises at least one internal cooling channel.

5. (Original) The method of claim 1, wherein said at least one tip insert comprises a plurality of cooling holes.

6. (Original) The method of claim 1, wherein said at least one tip insert comprises a superalloy based on a metal selected from the group consisting of iron, cobalt, and nickel.

7. (Original) The method of claim 6, wherein said at least one tip insert comprises a directionally solidified material.

8. (Original) The method of claim 6, wherein said at least one tip insert comprises a single crystal material.

9. (Original) The method of claim 1, wherein said blade comprises a first material and said at least one tip insert comprises a second material, and wherein each of a creep life, a

fatigue life, and an oxidation resistance for said first material is essentially equivalent to each of a creep life, a fatigue life, and an oxidation resistance of said second material, respectively.

10. (Original) The method of claim 1, wherein said blade comprises a first material and said at least one tip insert comprises a second material, and wherein at least one material property for said second material exceeds a corresponding material property for said first material, said at least one material property selected from the group consisting of oxidation resistance, creep life, and fatigue life.

11. (Original) The method of claim 10, wherein said second material comprises a platinum group metal modified nickel-based superalloy.

12. (Original) The method of claim 11, wherein said superalloy comprises a metal selected from the group consisting of Pt, Pd, Rh, Ir, and Ru.

13. (Original) The method of claim 10, wherein a melting temperature of said second material is greater than a melting temperature of said first material by at least about 80°C.

14. (Original) The method of claim 13, wherein said second material has an oxidation resistance at least about 3 times greater than an oxidation resistance of said first material.

15. (Original) The method of claim 14, wherein said second material comprises a material selected from the group consisting of Rh, Pt, Pd, and mixtures thereof.

16. (Original) The method of claim 15, wherein said at least one tip insert further comprises a substrate material, and wherein said second material is disposed on said substrate material.

17. (Original) The method of claim 16, wherein said second material comprises a layer with a cross-sectional thickness in the range from about 0.13 mm to about 0.64 mm.

18. (Original) The method of claim 15, wherein said second material comprises Rh at a level of at least about 65 atomic percent.

19. (Original) The method of claim 15, wherein said second material further comprises a metal selected from the group consisting of Ir, Ru, and mixtures thereof, at a level of up to about 5 atomic percent.

20. (Original) The method of claim 14, wherein said second material comprises a refractory superalloy.

21. (Original) The method of claim 20, wherein said refractory superalloy comprises Rh.

22. (Original) The method of claim 15, wherein said second material further comprises Cr.

23. (Original) The method of claim 22, wherein the Cr is present at a level of up to about 25 atomic percent.

24. (Original) The method of claim 22, wherein said second material further comprises Al.

25. (Original) The method of claim 24, wherein the Al is present at a level of up to about 18 atomic percent.

26. (Original) The method of claim 24, wherein said second material further comprises Ni.

27. (Original) The method of claim 26, wherein the Ni is present at a level of up to about 45 atomic percent.

28. (Original) The method of claim 10, wherein said second material comprises a directionally solidified eutectic material.

29. (Original) The method of claim 24, wherein said directionally solidified eutectic material comprises Ni, Ta, and C.

30. (Original) The method of claim 28, wherein said second material has a fatigue life at least about three times greater than a fatigue life of said first material.

31. (Original) The method of claim 10, wherein said second material comprises an oxide dispersion strengthened material.

32. (Original) The method of claim 31, wherein said oxide dispersion strengthened material comprises Ni, Cr, and yttrium oxide.

33. (Original) The method of claim 10, wherein said second material has a creep life at least about three times greater than that of said first material.

34. (Original) A gas turbine blade repaired by the method of claim 1.

35. (Original) A method for repair of a gas turbine blade, comprising:

providing a gas turbine blade, said blade comprising a blade tip and a blade body;

removing at least one portion of said blade tip;

providing at least one freestanding tip insert, said at least one tip insert comprising a material chosen from at least one of a single crystal nickel-based superalloy, a NiTaC directionally solidified eutectic alloy, and an oxide dispersion strengthened alloy; and

disposing said at least one tip insert onto said gas turbine blade body such that said tip insert replaces said at least one removed portion of said blade.

36. (Original) A method for repair of a gas turbine blade, comprising:

providing a gas turbine blade, said blade comprising a blade tip and a blade body;

removing at least one portion of said blade tip;

providing at least one freestanding tip insert, said at least one tip insert comprising a material selected from the group consisting of rhodium, platinum, palladium, and mixtures thereof; and

disposing said at least one tip insert onto said gas turbine blade body such that said tip insert replaces said at least one removed portion of said blade.

37. (Original) A method for manufacturing a gas turbine blade, comprising:

providing a gas turbine blade body;

providing at least one freestanding tip insert; and

disposing said at least one tip insert onto said gas turbine blade body such that a blade tip of said turbine blade comprises said at least one tip insert.

38. (Original) The method of claim 37, wherein said at least one tip insert comprises at least one squealer.

39. (Original) The method of claim 37, wherein disposing comprises joining said at least one tip insert to said blade by means of a process selected from the group consisting of welding, brazing, and diffusion bonding.

40. (Original) The method of claim 37, wherein said at least one tip insert comprises at least one internal cooling channel.

41. (Original) The method of claim 37, wherein said at least one tip insert comprises a plurality of cooling holes.

42. (Original) The method of claim 37, wherein said at least one tip insert comprises a superalloy based on a metal selected from the group consisting of iron, cobalt, and nickel.

43. (Original) The method of claim 42, wherein said at least one tip insert comprises a directionally solidified material.

44. (Original) The method of claim 42, wherein said at least one tip insert comprises a single crystal material.

45. (Original) The method of claim 37, wherein said blade body comprises a first material and said at least one tip insert comprises a second material, and wherein each of a creep life, a fatigue life, and an oxidation resistance for said first material is essentially equivalent to each of a creep life, a fatigue life, and an oxidation resistance of said second material, respectively.

46. (Original) The method of claim 37, wherein said blade comprises a first material and said at least one tip insert comprises a second material, and wherein at least one material property for said second material exceeds a corresponding material property for said first material, said at least one material property selected from the group consisting of oxidation resistance, creep life, and fatigue life.

47. (Original) The method of claim 46, wherein said second material comprises a platinum group metal modified nickel-based superalloy.

48. (Original) The method of claim 47, wherein said superalloy comprises a metal selected from the group consisting of Pt, Pd, Rh, Ir, and Ru.

49. (Original) The method of claim 46, wherein a melting temperature of said second material is greater than a melting temperature of said first material by at least about 80°C.

50. (Original) The method of claim 49, wherein said second material has an oxidation resistance at least about three times greater than an oxidation resistance of said first material.

51. (Original) The method of claim 50, wherein said second material comprises a material selected from the group consisting of Rh, Pt, Pd, and mixtures thereof.

52. (Original) The method of claim 51, wherein said at least one tip insert further comprises a substrate material, and wherein said second material is disposed on said substrate material.

53. (Original) The method of claim 52, wherein said second material comprises a layer with a cross sectional thickness in the range from about 0.13 mm to about 0.64 mm.

54. (Original) The method of claim 51, wherein said second material comprises Rh at a level of at least about 65 atomic percent.

55. (Original) The method of claim 51, wherein said second material further comprises a metal selected from the group consisting of Ir, Ru, and mixtures thereof, at a level of up to about 5 atomic percent.

56. (Original) The method of claim 50, wherein said second material comprises a refractory superalloy.

57. (Original) The method of claim 56, wherein said refractory superalloy comprises Rh.

58. (Original) The method of claim 51, wherein said second material further comprises Cr.

59. (Original) The method of claim 58, wherein the Cr is present at a level of up to about 25 atomic percent.

60. (Original) The method of claim 58, wherein said second material further comprises Al.

61. (Original) The method of claim 60, wherein the Al is present at a level of up to about 18 atomic percent.

62. (Original) The method of claim 60, wherein said second material further comprises Ni.

63. (Original) The method of claim 62, wherein the Ni is present at a level of up to about 45 atomic percent.

64. (Original) The method of claim 46, wherein said second material comprises a directionally solidified eutectic material.

65. (Original) The method of claim 64, wherein said directionally solidified eutectic material comprises Ni, Ta, and C.

66. (Original) The method of claim 46, wherein said second material has a fatigue life at least about three times greater than a fatigue life of said first material.

67. (Original) The method of claim 46, wherein said second material comprises an oxide dispersion strengthened material.

68. (Original) The method of claim 67, wherein said oxide dispersion strengthened material comprises Ni, Cr, and yttrium oxide.

69. (Original) The method of claim 46, wherein said second material has a creep life at least about three times greater than that of said first material.

70. (Original) A gas turbine blade manufactured by the method of claim 37.

71. (Original) A method for manufacturing a gas turbine blade, comprising:

providing a gas turbine blade body;

providing at least one freestanding tip insert, said at least one tip insert comprising a material chosen from at least one of a single crystal nickel-based superalloy, a NiTaC directionally solidified eutectic alloy, and an oxide dispersion strengthened alloy; and

disposing said at least one tip insert onto said gas turbine blade body such that a blade tip of said turbine blade comprises said tip insert.

72. (Original) A method for manufacturing a gas turbine blade, comprising:

providing a gas turbine blade body;

providing at least one freestanding tip insert, said tip insert comprising a material selected from the group consisting of rhodium, platinum, palladium, and mixtures thereof; and

disposing said at least one tip insert onto said gas turbine blade body such that a blade tip of said turbine blade comprises said at least one tip insert.

73. (Original) A freestanding tip insert for manufacture and repair of a tip of a gas turbine blade, said tip insert comprising an external surface that substantially conforms with specified nominal dimensions for an external surface of said blade.

74. (Original) The tip insert of claim 73, said tip insert comprising at least one internal cooling channel.

75. (Original) The tip insert of claim 73, said tip insert comprising a plurality of cooling holes.

76. (Original) The tip insert of claim 73, said tip insert comprising a superalloy based on a metal selected from the group consisting of iron, cobalt, and nickel.

77. (Original) The tip insert of claim 76, wherein said superalloy comprises a directionally solidified material.

78. (Original) The tip insert of claim 76, wherein said superalloy comprises a single crystal material.

79. (Original) The tip insert of claim 73, wherein said tip insert comprises a material having

a creep life of at least about 1000 hours tested at about 1150°C and about 21 MPa;

a fatigue life of at least about 33,000 cycles to failure tested at about 20 cycles per minute and a strain range of about 0.1% at about 1150°C; and

an oxidation resistance of at least about 6 h-cm2/mg at about 1150°C.

80. (Original) The tip insert of claim 79, wherein said material comprises a platinum group metal modified nickel-based superalloy.

81. (Original) The tip insert of claim 80, wherein said superalloy comprises a metal selected from the group consisting of Pt, Pd, Rh, Ir, and Ru.

82. (Original) The tip insert of claim 79, wherein said material has an oxidation resistance of at least about 20 h-cm2/mg at about 1150°C.

83. (Original) The tip insert of claim 82, wherein said material comprises a metal selected from the group consisting of Rh, Pt, Pd, and mixtures thereof.

84. (Original) The tip insert of claim 83, wherein said at least one tip insert further comprises a substrate material, and wherein said second material is disposed on said substrate material.

85. (Original) The tip insert of claim 84, wherein said second material comprises a layer with a cross-sectional thickness in the range from about 0.13 mm to about 0.64 mm.

86. (Original) The tip insert of claim 83, wherein said material comprises Rh at a level of at least about 65 atomic percent.

87. (Original) The tip insert of claim 83, wherein said material further comprises a metal selected from the group consisting of Ir, Ru, and mixtures thereof, at a level of up to about 5 atomic percent.

88. (Original) The tip insert of claim 82, wherein said material comprises a refractory superalloy.

89. (Original) The tip insert of claim 88, wherein said refractory superalloy comprises Rh.

90. (Original) The tip insert of claim 83, wherein said material further comprises Cr.

91. (Original) The tip insert of claim 90, wherein the Cr is present at a level of up to about 25 atomic percent.

92. (Original) The tip insert of claim 90, wherein said material further comprises Al.

93. (Original) The tip insert of claim 92, wherein the Al is present at a level of up to about 18 atomic percent.

94. (Original) The tip insert of claim 92, wherein said material further comprises Ni.

95. (Original) The tip insert of claim 94, wherein the Ni is present at a level of up to about 45 atomic percent.

96. (Original) The tip insert of claim 79, wherein said material comprises a directionally solidified eutectic material.

97. (Original) The tip insert of claim 96, wherein said directionally solidified eutectic material comprises Ni, Ta, and C.

98. (Original) The tip insert of claim 79, wherein said material has a fatigue life of at least about 100,000 cycles to failure tested at about 20 cycles per minute and a strain range of about 0.1% at about 1150°C.

99. (Original) The tip insert of claim 79, wherein said material comprises an oxide dispersion strengthened material.

100. (Original) The tip insert of claim 99, wherein said oxide dispersion strengthened material comprises Ni, Cr, and yttrium oxide.

101. (Original) The tip insert of claim 79, wherein said material has a creep life of at least about 3000 hours tested at about 1150°C and about 21 MPa;

102. (Original) A freestanding tip insert for manufacture and repair of a tip of a gas turbine blade, said tip insert comprising an external surface that substantially conforms with specified nominal dimensions for an external surface of said blade, said tip insert further comprising a material chosen from at least one of a single crystal nickel-based superalloy, a NiTaC directionally solidified eutectic alloy, and an oxide dispersion strengthened alloy.

103. (Original) A freestanding tip insert for manufacture and repair of a tip of a gas turbine blade, said tip insert comprising an external surface that substantially conforms with specified nominal dimensions for an external surface of said blade, said tip insert further comprising a material selected from the group consisting of rhodium, platinum, palladium, and mixtures thereof.

104. (Currently Amended) A gas turbine blade comprising:

a turbine blade body <u>comprising a first material</u>; and

a blade tip;

wherein said blade tip comprises at least one tip insert comprising a second material joined to said blade body<u>, and</u>

<u>wherein said second material comprises at least one of</u>

(i) a material selected from the group consisting of Rh, Pt, Pd, and mixtures thereof;

(ii) a directionally solidified eutectic material;

(iii) an oxide dispersion strengthened material; and

(iv) combinations of any of the foregoing.

105. (Original) The gas turbine blade of claim 104, wherein a cross sectional thickness of said at least one tip insert is less than a wall thickness of said turbine blade body.

106. (Original) The gas turbine blade of claim 104, wherein a cross sectional thickness of said at least one tip insert is at least equal to a wall thickness of said turbine blade body.

107. (Original) The gas turbine blade of claim 104, wherein said at least one blade tip comprises at least one squealer.

108. (Original) The gas turbine blade of claim 104, wherein said at least one tip insert is joined to said blade body by means of a process selected from the group consisting of welding, brazing, and diffusion bonding.

109. (Original) The gas turbine blade of claim 104, wherein said at least one tip insert comprises at least one internal cooling channel.

110. (Original) The gas turbine blade of claim 104, wherein said at least one tip insert comprises a plurality of cooling holes.

111. (Original) The gas turbine blade of claim 104, wherein said at least one tip insert comprises a superalloy based on a metal selected from the group consisting of iron, cobalt, and nickel.

112. (Original) The gas turbine blade of claim 111, wherein said at least one tip insert comprises a directionally solidified material.

113. (Original) The gas turbine blade of claim 111, wherein said at least one tip insert comprises a single crystal material.

114. (Canceled)

115. (Canceled)

116. (Currently Amended) The gas turbine blade of claim ~~115~~ 104, wherein said second material comprises a platinum group metal modified nickel-based superalloy.

117. (Original) The gas turbine blade of claim 116, wherein said superalloy comprises a metal selected from the group consisting of Pt, Pd, Rh, Ir, and Ru.

118. (Currently Amended) The gas turbine blade of claim ~~115~~ 104, wherein a melting temperature of said second material is greater than a melting temperature of said first material by at least about 80°C.

119. (Original) The gas turbine blade of claim 118, wherein said second material has an oxidation resistance at least about three times greater than an oxidation resistance of said first material.

120. (Canceled)

121. (Currently Amended) The gas turbine blade of claim ~~120~~ 104, wherein said at least one tip insert further comprises a substrate material, and wherein said second material is disposed on said substrate material.

122. (Original) The method of claim 121, wherein said second material comprises a layer with a cross sectional thickness in the range from about 0.13 mm to about 0.64 mm.

123. (Currently Amended) The gas turbine blade of claim ~~120~~ 104, wherein said second material comprises Rh at a level of at least about 65 atomic percent.

124. (Currently Amended) The gas turbine blade of claim ~~120~~ 104, wherein said second material further comprises a metal selected from the group consisting of Ir, Ru, and mixtures thereof, at a level of up to about 5 atomic percent.

125. (Original) The gas turbine blade of claim 119, wherein said second material comprises a refractory superalloy.

126. (Original) The gas turbine blade of claim 125, wherein said refractory superalloy comprises Rh.

127. (Currently Amended) The gas turbine blade of claim ~~120~~ 104, wherein said second material further comprises Cr.

128. (Original) The gas turbine blade of claim 127, wherein the Cr is present at a level of up to about 25 atomic percent.

129. (Original) The gas turbine blade of claim 127, wherein said second material further comprises Al.

130. (Original) The gas turbine blade of claim 129, wherein the Al is present at a level of up to about 18 atomic percent.

131. (Original) The gas turbine blade of claim 129, wherein said second material further comprises Ni.

132. (Original) The gas turbine blade of claim 131, wherein the Ni is present at a level of up to about 45 atomic percent.

133. (Canceled)

134. (Currently Amended) The gas turbine blade of claim ~~133~~ 104, wherein said directionally solidified eutectic material comprises Ni, Ta, and C.

135. (Currently Amended) The gas turbine blade of claim ~~115~~ 104, wherein said second material has a fatigue life at least three times greater than a fatigue life of said first material.

136. (Canceled)

137. (Currently Amended) The gas turbine blade of claim ~~115~~ 104, wherein said oxide dispersion strengthened material comprises Ni, Cr, and yttrium oxide.

138. (Currently Amended) The gas turbine blade of claim ~~115~~ 104, wherein said second material has a creep life at least three times greater than that of said first material.

139. (Original) A gas turbine blade comprising:

a turbine blade body; and

a blade tip;

wherein said blade tip comprises at least one tip insert joined to said blade body, said at least one tip insert comprising a material chosen from at least one of a single crystal nickel-based superalloy, a NiTaC directionally solidified eutectic alloy, and an oxide dispersion strengthened alloy.

140. (Original) A gas turbine blade comprising:

a turbine blade body; and

a blade tip;

wherein said blade tip comprises at least one tip insert joined to said blade body, said at least one tip insert comprising a material selected from the group consisting of rhodium, platinum, palladium, and mixtures thereof.